

# Nanocomposite Scintillators for Gamma-ray Astronomy

Completed Technology Project (2014 - 2015)



## Project Introduction

With the *Fermi* mission well into its extended phase, the time is right to plan for the next generation gamma-ray project. No matter what form this mission might take, it will use scintillation-based materials as either primary or anticoincidence detectors. This project will develop and characterize nanocomposite scintillators for space-based applications, specifically tuned to medium energy (1 MeV - 100 MeV) gamma-ray astrophysics. Nanocomposites are not only easier to manufacture and are thus cheaper than traditional scintillators while still providing similar or better performance, but they can be tuned to a specific application.

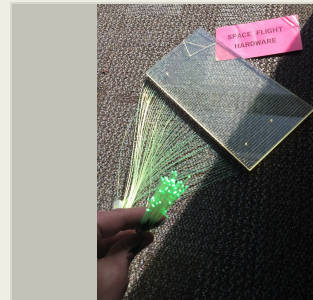
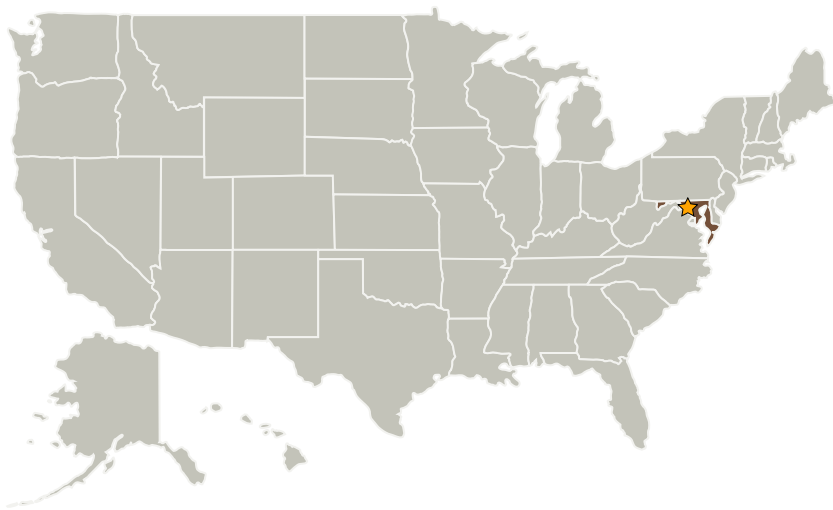
We propose to develop and characterize nanocomposite scintillators for space-based applications, specifically tuned to medium energy (ME; 1 MeV - 100 MeV) gamma-ray astrophysics. At the end of the funded phase of this project we plan to have a working understanding of the manufacture and performance of several different types of nanocomposite materials. The end goal is not to have a working prototype of a detector but to be in a position where we can produce a detector tuned to a specific application based on future funding sources.

## Anticipated Benefits

Every major gamma-ray mission (ME or HE) has included some type of scintillator-based detector, because  $\gamma$ -ray telescopes are essentially particle detectors.

Nanocomposite scintillators could also be used as radiation monitors on Earth.

## Primary U.S. Work Locations and Key Partners



Sample Scintillator with Wavelength Shifting Fibers

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland

## Primary U.S. Work Locations

Maryland

## Images



## Sample Scintillator with Wavelength Shifting Fibers

Sample Scintillator with Wavelength Shifting Fibers  
(<https://techport.nasa.gov/image/4197>)

## Project Website:

<http://sciences.gsfc.nasa.gov/sed/>

## Organizational Responsibility

## Responsible Mission Directorate:

Mission Support Directorate (MSD)

## Lead Center / Facility:

Goddard Space Flight Center (GSFC)

## Responsible Program:

Center Independent Research &amp; Development: GSFC IRAD

## Project Management

## Program Manager:

Peter M Hughes

## Project Manager:

Stanley D Hunter

## Principal Investigator:

Jeremy S Perkins

## Co-Investigators:

David J Thompson  
Elizabeth A Hays  
George Manos  
Alexander A Moiseev  
Julie E Mcenery

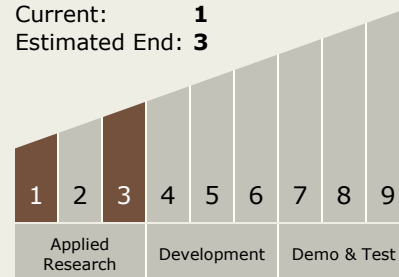
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## Technology Maturity (TRL)

Start: **1**  
Current: **1**  
Estimated End: **3**



## Technology Areas

### Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - └ TX11.5 Mission Architecture, Systems Analysis and Concept Development
    - └ TX11.5.1 Tools and Methodologies for Defining Mission Architectures or Mission Design